

and is apparently attached throughout, although its base is covered a little by the crushed body; the right leg lies below both the wings, and is apparently partially detached, though but slightly, from the coxæ; the tibio-tarsal articulation can be distinguished, but not the tarsal joints. The wings are bent over downward in a position the reverse of that of repose. The fore-wing covers the hind-wing, as in nature, but to such an extent as to conceal the greater part of it; the guttered portion of the inner margin of the hind-wings is almost fully expanded, but apparently has a fold next the submedian nervure. The fringe of the fore-wing seems to be gone, but that of the hind-wing is preserved nearly throughout. Head, fore and middle legs, wings of the right side, and abdomen are wholly wanting.

"The upper surface of the wing is, therefore, the part which attracts most attention."

The above description throws an entirely new light upon this fossil, and is exceedingly interesting.

Lethites reynesii, another Eocene species, is placed next to the genus *Lethe*; the latter comes close to *Melanitis* in Westwood and Hewitson's "Genera of Diurnal Lepidoptera," a fact which Mr. Scudder considers of some interest; the two groups, however, are widely separated in some recent classifications, in which the structural relations of the genera of *Satyrinae* have received special attention.

The Tertiaries of Radoboj afford another remarkable fossil (*Mylothrites pluto*) which Mr. Scudder, differing widely from all previous writers, refers, on we think insufficient grounds, to the sub-family *Picrinæ*, inasmuch as the spots on the wings are not of the same simple character as those of *Hebomoia* and allies, but are true ocelli, the zones of which are clearly visible even in the drawing on Plate II. (compare Figs. 14 and 17). The portion of a hind wing (Fig. 15) has been also somewhat rashly referred to *Mylothrites*, its venation being markedly different, and agreeing more nearly with the Eastern genus *Terinos* than with any other group known to us.

Mr. Scudder seems to have indicated the correct position of *Coliates proserpina* and *Pontia Freyeri*. In the case of the former, his task, owing to the obscure character of the original, must, as he says, have been a difficult one.

Spots on the wings, such as are represented on Plate II., Fig. 5, are rarely to be met with among the *Picrinæ*, but do occur in some males of the genus *Appias*.

It is probable that Mr. Scudder is again correct with regard to the position of *Thaites ruminiana*, although the general pattern, form of the wings, and large abdomen are all far more like *Dynastor* or *Castnia*.

Thanaites vetula and *Pamphilites abdita* have manifestly the proper places assigned to them, and great credit is due to the author for the labour which he has expended in their determination.

Mr. Scudder's conjectures respecting the "food-plants of Tertiary Caterpillars" are exceedingly interesting, as also his remarks on "the present distribution of Butterflies most nearly allied to fossil species." Asiatic forms having the facies of *Pamphilites abdita* are not, however, as he supposes, unknown; the *Urbicolæ* of East India are perhaps not as yet largely represented in American collections.

In his "Notice of Insects which have been erroneously referred in recent times to Butterflies," Mr. Scudder

dwells upon the discussion between himself and Mr. Butler respecting *Palæontina oollica*, and gives facsimiles of that author's illustrations, with an additional sketch representing his own view of the characters of the species. From a comparison of the five illustrations it is difficult to conclude that Mr. Scudder has proved his case. The venation, as given by him, not only does not agree with that of any genus of *Lepidoptera*, but is entirely at variance with what is found in any insect. To associate it with the *Cicadinae* is impossible, seeing that these insects have irregular neuration, whereas Scudder's figure furnishes us with a Lepidopteroid type having anomalous cross-veins and an incomprehensible discoidal cell.

The assertion that "none of the median nor any of the inferior subcostal nervules are ever branched certainly requires modification; the genus *Amathusia* has a well-marked spur on the third median branch, which conveys the impression of a fourth median nervule, whilst the genus *Moschoneura* emits its upper discoidal from the inferior margin of the subcostal.*

Mr. Scudder, in America, is surely a little too hard upon his entomological brethren on this side of the Atlantic, when he speaks of the new Linnæan room at Burlington House in which they held their meeting as "a poorly lighted hall." See p. 95.

We cannot conclude without expressing our admiration of the beautifully executed plates which accompany the letterpress.

BURCHETT'S "PRACTICAL PLANE GEOMETRY"

Practical Plane Geometry. By E. S. Burchett. (London and Glasgow: W. Collins, Sons, and Co., 1876.)

THIS is a carefully got-up and good work on the subject of which it treats. After the usual preliminary matter on definitions and the use of instruments are given 333 problems. This may appear to be too large a number for school teaching, but the work is principally intended for students in Art schools. For school purposes, and we have more than once recently pointed out that the subject is taught as affording a good initiation to the study of pure geometry, we should recommend the master to make a selection such as he thinks adapted to the attainments of his pupils or fitted to the end he has in view in taking up the study. Plates LII. to LXIII. are devoted to Applied Geometry (such as curves of mouldings, Gothic tracery, construction of scales, &c.). An Appendix (Plates LXIV. to LXXI.) treats of the Elements of Orthographic Projection. This last portion we are told is given expressly to meet the requirements of the more extended range of the Second Grade Examination of the present day. We have verified most of the constructions, which are clearly given, and in the main admit of demonstration on pure geometric principles. Some relating to the construction of polygons, three on the contact of circles, and some few relating to the areas of circles, are founded on approximative methods. The arrangement of the text and of the plates appears to us to be a good one. The book must be used in a position at right angles to the usual one, and then the text is on

* See Westwood's "Oriental Entomology," p. 40, and compare "Trans. Ent. Soc.," 1870, p. 486; also "Cistula Entomologica," i. p. 54.

the left-hand page, and so above the plates, which are immediately under the pupil's eyes. The printing and the plates (the only figure that does not please us is the oval on Plate II.) leave nothing to be desired.

We proceed to point out a few matters which we think admit of improvement. Plate II. in the definition of a circle *invarying* is used; why not "constant?" The construction of Fig. 6 (Plate IV.) is hardly satisfactory to our view, though it is one very frequently given; the tangent to the two arcs is not obtained by a legitimate method. We cannot make out the definition of an harmonic mean given on Plate VII., but the means are correctly constructed. In Fig. 31 (text), for $GH:HA$, read *vice versa*. We may remark that it is a curious fact that the approximative construction given in Fig. 87 is true in the cases of regular figures of three, four, and six sides. In Fig. 99 (text) read "through F and E." In Fig. 112 (text) arcs "cutting in C," not G. Constructions to Figs. 123, 125 give particular ellipses; so, in the case of the parabolas in Figs. 138, 139, we note that certain figures are stated to be co-centric and certain curves have asymptotes. In Fig. 271 (text) read to cut in "I and H." We object, on pure geometric grounds, to the constructions in Figs. 278, &c., where a line is found equal to the semi-circumference of a circle, &c.; also the inscribed circle of a square and the inscribed triangle are stated as being in the ratio, triangle : circle : square, as 2 : 3 : 4. In Fig. 279 (text) the two last A's should be D. The construction to Fig. 297 (to draw a line to bisect any triangle from a given point within it) is new to us, and on a cursory examination of it we have not satisfied ourselves of its correctness. In Fig. 314, for XY , read ZY . In Fig. 316, "the square on," or some such words have been omitted. In Fig. 323 the limitations have not been laid down. In Fig. 329, "join point x," &c.; in 331, for "rectangle" read "parallelogram." These trivial oversights will serve to show how correctly the text has been printed.

OUR BOOK SHELF

Observaciones Magneticas y Meteorologicas del Colegio de Belen de la Compania de Jesus en la Habana, 1873 y 1874. (Habana, 1874 and 1875.)

THE observations made at the College of the Society of Jesus, Havana, are peculiarly valuable for the fulness and care with which they are made, and for the completeness with which the observations themselves and the monthly means and extremes are given in each monthly table and its accompanying diagram. The diagrams, which have been published in their present improved form since June 1873, and which exhibit on one sheet the two-hourly observations as made daily from 4 A.M. to 10 P.M. of all the meteorological and magnetical elements, will very much facilitate the study of those inquiries which deal with the inter-relations of these elements. To these observations are added the daily amounts of the rainfall and evaporation—the latter being of great interest as contributing to our knowledge of the evaporation in inter-tropical regions, of which so little is known. Whilst only the daily amounts of the rainfall is given, each hour during which rain falls is noted, together with the hour of occurrence of thunder and other irregularly recurring phenomena. As regards the diurnal variations of the wind it changes from about S.E. in the early morning, through E. and N.E. to N.N.E. its most northerly point, which is usually reached about 2 P.M., and thence in the

reverse direction through N.E. and E. to E.S.E., which is reached about 10 P.M. The diurnal velocity is at the minimum at 4 A.M., rises to the maximum at 2 P.M., and thence falls steadily to the minimum. The N. and N.E. winds are decidedly the strongest, and the S.E. the weakest, the ratio being as two to one; in other words, the sea-breeze blows with double the velocity of the land-breeze at this station.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

Blowpipe Analysis

MR. HUMPIDGE (vol. xiii. p. 208), on the entirely gratuitous assumption that I use "commercial reagents"—whatever that term may mean—says that there is probably iron in my soda.

To this I only reply that I will undertake to show pyrologically the presence of 0.01 per cent. of iron oxide in a fragment of a salt the size of a pin's head; and that, when Mr. Humpidge can do as much without using the dangerous test potassium ferrocyanide (which itself contains iron), I will admit his right to assume that he knows his tools better than other workmen.

No one has ever doubted the proportional relativity in precipitating power between a drop and a gallon of water, but if Mr. Humpidge will only do me the justice not to mutilate my statements in the reproduction, he will repeat that a precipitate could not be shown in a drop of water "on a fused mass upon an aluminium plate."

W. A. ROSS

Shepherd's Bush, W., Jan. 14

The D-line Spectrum

WILL Prof. Stokes give us the reason of his now holding that his first—to all appearance, extremely rational—conclusion, that, in consequence of "the powerful affinities of sodium, it could not exist in a free state in the flame of a spirit-lamp," is "erroneous?"

Shepherd's Bush, W., Jan. 8

W. A. ROSS

The Difference of Thermal Energy transmitted to the Earth by Radiation from different parts of the Solar Surface.

THE tenor of certain letters received from scientific persons on the above subject induces me to lay the following statement before the readers of NATURE:—

I. Previous to undertaking a systematic investigation of the mechanical properties of solar heat, I examined thoroughly the merits of Laplace's famous demonstration relating to the absorptive power of the sun's atmosphere, proving that only one-twelfth of the energy developed by the sun is transmitted to the earth. The demonstration being based on the assumption that the sun's rays emit energy of equal intensity in all directions, my initiary step was that of testing practically the truth of that proposition. It has been asserted that Laplace did not propound the singular doctrine involved in such a proposition, I therefore feel called upon, before proving its unsoundness, to quote the words employed by the celebrated mathematician. (See "Mécanique Céleste," tome iv. page 284.) Having called attention to the fact that any portion of the solar disc as it approaches the limb ought to appear *more brilliant* because it is viewed under a *less angle*, Laplace adds:—"Car il est naturel de penser que chaque point de la surface du soleil renvoie une lumière égale dans tous les sens." Let $abcd$, in the annexed diagram, Fig. 1, represent part of the border of the sun, and ba , cd , small equal arcs; ad' , bb' , cc' , dd' , being parallel rays projected towards the earth. Laplace's theory asserts that owing to the concentration of the rays the radiation emanating from the portion dc transmits *greater* intensity towards the earth than ba , in the proportion of cd to fc . The proposition is thus stated in "Mécanique Céleste": "Call θ the arc of a great circle of the sun's surface, included between the luminous point and the centre of the sun's disc, the sun's radius being taken for unity; a very small portion a of the surface being removed to the distance θ